

CLAIMS

1. A method of calibrating and/or validating the calibration of a material analyzer having a measurement region and measurement apparatus for measuring properties of a material specimen occupying a given portion of the measurement region while the material specimen is transported through the measurement region in a given direction, comprising the steps of:

(a) placing a calibration/reference standard of known chemical composition within the measurement region of the analyzer to simulate the occupancy of the given portion of the measurement region by the material specimen;

(b) making measurements with the measurement apparatus of the analyzer while the calibration/reference standard is within the measurement region; and

(c) calibrating or validating the calibration of the measurement apparatus in accordance with said measurements;

wherein step (a) comprises the step of:

(d) positioning within the measurement region a set of elongated calibration/reference standard components that are individually packaged in a hard shell for being so combined with each other as to simulate the occupancy within the given portion of the measurement region by the material specimen, and are further individually packaged for unaided handling of individual said components by one or two persons, with the individually packaged components being positioned within the measurement region so that their respective longitudinal axes are approximately aligned with the direction in which the material specimen is transported through the measurement region.

2. A method according to Claim 1, wherein gripping means are attached to at least one end of the individual shells, and wherein step (a) further comprises the step of:

(e) handling said gripping means to position the individually packaged components within the measurement region of the analyzer.

3. A method according to Claim 2, wherein the individual shells are longer than the dimension of the measurement region in the direction in which the material specimen is transported through the measurement region, and wherein step (e) further comprises the step of:

(f) individually inserting the individual shells into the measurement region of the analyzer in such a manner that no part of a person handling the gripping means is disposed within the measurement region during said insertion.

4. A method according to Claim 1, wherein step (d) comprises the step of:

(e) disposing individually packaged calibration/reference standard components of different lateral dimensions in combination with each other to simulate the occupancy of the measurement region by the material specimen during the measurement of the properties of the material specimen.

5. A method according to Claim 1, wherein step (d) comprises the step of:

(e) disposing individually packaged calibration/reference standard components of respectively different chemical composition in combination with each other to simulate the chemical composition of the material specimen.

6. A method according to Claim 1, wherein step (d) comprises the step of:

(e) disposing individually packaged calibration/reference standard components of different lateral dimensions and of respectively different chemical composition in combination with each other to simulate the occupancy of the measurement region by the material specimen during the measurement of the properties of the material specimen and to simulate the chemical composition of the material specimen.

7. A method according to Claim 1, wherein at least one end of the packaging of each of the calibration/reference standard components displays a color code indicating the chemical composition of the respective calibration/reference standard component, and wherein step (d) comprises the step of:

(e) disposing the individually packaged components so that the respective color codes for all of the components are visible from a single location.

8. A method according to Claim 1, wherein common exterior locations on the packages of the calibration/reference standard components respectively display color-codes indicating the chemical composition of the respective calibration/reference standard components, and wherein step (d) comprises the step of:

(e) disposing the individually packaged components so that the respective color codes for all of the components are visible from a single location.

9. A method according to Claim 1, wherein the individual shells and the longitudinal extent of the standard component of said known chemical composition packaged therein are longer than a given dimension of the measurement region in the direction in which the material specimen is transported through the measurement region, and wherein the individual shells include a filler material disposed between the standard component of known chemical composition and at least one end of the shell, and wherein step (d) comprises the step of:

(e) disposing the individually packaged components within the measurement region so that the standard components of known chemical composition extend throughout the given dimension of the measurement region and so that the filler material is not disposed within the measurement region.

10. A method according to Claim 1, wherein the individual shells are tubular and of approximately uniform lateral dimensions in a portion of the shell that contains the standard component of said known chemical composition; and wherein step (d) comprises the step of:

(e) disposing the individual shells within the measurement region so that the respective portions of approximately uniform lateral dimensions are disposed within the measurement region.

11. A method according to Claim 1, wherein the individually packaged calibration/reference standard components are packaged for unaided handling by one person.

12. A calibration/reference standard component of known chemical composition for use in calibrating and/or validating the calibration of a material analyzer of the type that has a measurement region and measurement apparatus for measuring properties of a material specimen occupying a given portion of the measurement region, and which is calibrated or the calibration is validated by taking measurements while a calibration/reference standard of known chemical composition is disposed within the measurement region of the analyzer to simulate the occupancy of the given portion of the measurement region by the material specimen,

wherein the component is packaged in an elongated hard shell for being so combined with other said components in said measurement region as to simulate the occupancy within the given portion of the measurement region of the material specimen; and

wherein the component is packaged for unaided handling by one or two persons.

13. A calibration/reference standard component according to Claim 12, wherein the packaging includes gripping means attached to at least one end of the shell for use in handling the shell.

14. A calibration/reference standard component according to Claim 12, wherein at least one end of the packaging displays a color code indicating the chemical composition of the calibration/reference standard component.

15. A calibration/reference standard component according to Claim 12, wherein an exterior location on the packaging displays a color code indicating the chemical composition of the calibration/reference standard component.

5 16. A calibration/reference standard component according to Claim 12, wherein the shell includes a filler material disposed between the standard component of said known chemical composition and at least one end of the shell.

10 17. A calibration/reference standard component according to Claim 12, wherein the shell is tubular and of approximately uniform lateral dimensions in a portion of the shell that contains the standard component of said known chemical composition.

18. A calibration/reference standard component according to Claim 12, wherein the component is packaged for unaided handling by one person.

15

19. A set of calibration/reference standard components for use in calibrating and/or validating the calibration of a material analyzer of the type that has a measurement region and measurement apparatus for measuring properties of a material specimen occupying a given portion of the measurement region, and which is calibrated or the calibration is validated by taking measurements while a calibration/reference standard of known chemical composition is disposed within the measurement region of the analyzer to simulate the occupancy of the given portion of the measurement region by the material specimen, the set comprising:

elongated calibration/reference standard components that are individually packaged in a hard shell for being so combined with each other in said measurement region as to simulate the occupancy within the given portion of the measurement region of the material specimen, and are further individually packaged for unaided handling of individual said components by one or two persons.

20. A set of calibration/reference standard components according to Claim 19, comprising gripping means attached to at least one end of the individual shells for use in handling each of the individual shells.

21. A set of calibration/reference standard components according to Claim 14 in combination with a material analyzer that has a measurement region of a given dimension in a direction in which the material specimen is transported through the measurement region during measurement of the properties of the material specimen,

5 wherein the individual shells are longer than the given dimension of the measurement region in the direction in which the material specimen is transported through the measurement region so that gripping means attached to at least one end of the individual shells can be disposed outside the measurement region when the individual shells are disposed within the measurement region with their respective longitudinal axes
10 approximately aligned with said given direction.

22. A set of calibration/reference standard components according to Claim 19, wherein some of the individually packaged calibration/reference standard components have a different lateral dimension than some of the other the individually packaged
15 calibration/reference standard components.

23. A set of calibration/reference standard components according to Claim 19, wherein some of the individually packaged calibration/reference standard components have a different lateral dimension and a different chemical composition than some of the
20 other individually packaged calibration/reference standard components.

24. A set of calibration/reference standard components according to Claim 19, wherein some of the individually packaged calibration/reference standard components have a different chemical composition than some of the other individually packaged
25 calibration/reference standard components.

25. A set of calibration/reference standard components according to Claim 19, wherein at least one end of the packaging of each of the calibration/reference standard components displays a color code indicating the chemical composition of the respective calibration/reference standard component.

26. A set of calibration/reference standard components according to Claim 19, wherein a common exterior location on the packaging of the calibration/reference standard components displays color codes indicating the chemical composition of the respective calibration/reference standard components.

27. A set of calibration/reference standard components according to Claim 19, wherein the individual shells include a filler material disposed between the standard component of said known chemical composition and at least one end of the shell.

28. A set of calibration/reference standard components according to Claim 19, wherein the individual shells are tubular and of approximately uniform lateral dimensions in a portion of the shell that contains the standard component of said known chemical composition.

29. A set of calibration/reference standard components according to Claim 19, wherein the individually packaged calibration/reference standard components are packaged for unaided handling by one person.